

CLAIMS

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at
1. ~~A system for providing a first signal to a circuit and receiving a~~
2 second signal from said circuit over an electrical connection, said system
comprising:

4 first means for providing said first signal to said circuit via a first
electrical path, said first signal having alternating first and second states;

6 second means for generating a second signal; and

third means for receiving said second signal via said first electrical path,
8 ~~said second signal being received during said second state of said first signal.~~

2 2. The system of Claim 1 wherein said first and second states are
continuously alternating states.

2 3. The system of Claim 1 wherein said first signal provides power to said
circuit when said first signal is in said first state.

2 4. The system of Claim 1 wherein said first means further includes
means for adjusting a duty cycle and/or frequency of said first signal.

2 5. The system of Claim 4 wherein said first means includes a signal
generator.

2 6. The system of Claim 5 wherein said signal generator includes a
voltage source, a switching circuit connected to said source and a control circuit
connected to said switching circuit, said control circuit effective to cause said
4 switching circuit to output said first signal having first and second states at said
duty cycle.

2 7. The system of Claim 6 wherein said switching circuit includes a
transistor having a control terminal connected to said control circuit, one
terminal connected to said source and one terminal connected to said electrical
4 path.

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8. The system of Claim 1 wherein said second means includes a keypad.

9. The system of Claim 8 wherein said circuit includes at least one light source for illuminating said keypad.

10. The system of Claim 9 wherein said light source is powered by said first signal during the first state thereof.

11. The system of Claim 10 wherein said second signal is generated by said keypad during the second state of said first signal.

12. The system of Claim 11 wherein said keypad includes a plurality of resistive elements connected in a resistive ladder network.

13. The system of Claim 12 wherein each of said resistive elements correspond to a respective key of said keypad.

14. The system of Claim 1 further including means for processing the second signal.

15. A system for providing input from a keypad and providing lighting to said keypad over an electrical connection comprising:

key detection means for providing a signal over said electrical connection indicative of a key pressed on said keypad;

lighting means for lighting said keypad via said electrical connection;

and

multiplexing means for selectively activating said lighting means and said key detection means at a predetermined rate.

16. The system of Claim 15 wherein said predetermined rate is a rate sufficient to make said lighting means and said keypad detection means appear to be activated simultaneously by said multiplexing means to a user of said keypad.

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13/ 17. The system of Claim 15/ further including timer means for
2 establishing said predetermined rate.

4/ 18. The system of Claim 3/ 17 wherein said timer means includes a
2 computer connected to said keypad via a first connection.

15/ 19. The system of Claim 11/ 18 wherein said first connection includes a pin
2 contact.

6/ 20. The system of Claim 1/ 15 wherein said keypad is a keypad on a
2 cellular telephone.

7/ 21. The system of Claim 6/ 20 wherein said cellular telephone is
2 incorporated into a personal digital assistant.

8/ 22. The system of Claim 17/ 21 wherein said keypad is located on an exterior
2 portion of a flip of said personal digital assistant.

a/ 23. A system for providing bi-directional information over a single
2 connection between a keypad and a signal processing circuit comprising:

4 first means for selectively providing a high voltage state or a low voltage
state on said single connection at a predetermined rate;

6 second means for transferring a first signal from said computer to said
keypad over said connection in response to said high voltage state on said
connection; and

8 third means for transferring a second signal from said keypad to said
circuit over said connection in response to said low voltage state on said
10 connection.

10/ 24. The system of Claim 9/ 23 wherein said first means includes a timer
2 connected to a switch that is selectively activated at said predetermined rate by
said timer, said switch for selectively bypassing a pull-up resistor to a high
4 voltage source to provide said high voltage state at one end of said pull-up
resistor when said pull-up resistor is bypassed and to provide said low voltage

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- 6 state at said one end of said pull-up resistor when said pull-up resistor is not
bypassed, said one end of said pull-up resistor connected to said connection.

23/ 25. The system of Claim 23/ wherein said first signal is a keypad lighting
2 signal.

24/ 26. The system of Claim 25/ wherein said second means includes one or
2 more light emitting diodes arranged in a lighting circuit connected to said
single connection, said one or more light emitting diodes activated via said high
4 voltage state on said connection.

25/ 27. The system of Claim 23/ wherein said second signal is a voltage
2 representative of a specific key pressed on said keypad.

26/ 28. The system of Claim 27/ wherein said third means includes a resistive
2 ladder connected to said single connection for providing said voltage on said
single connection when said single connection is at said low voltage state.

27/ 29. The system of Claim 27/ wherein said circuit includes an analog-to-
2 digital converter for converting said voltage to a digital signal.

28/ 30. The system of Claim 29/ wherein said circuit further includes a
2 computer that runs software for reading said digital signal.

29/ 31. A mobile communications device including an integrated personal
2 digital assistant and cellular telephone comprising:

- 4 first means for receiving and transmitting communications signals;
second means for processing said communications signals, for receiving
an input signal, and for providing an output signal;
6 third means for providing said input signal in response to a user-input;
fourth means for connecting said third means to said second means;
8 fifth means for providing a first function and a second function between
said second means and said third means via said fourth means so that said first

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10 function and said second function appear to a user to be implemented simultaneously.

180 32. The mobile communications device of Claim 31 wherein said fourth
2 means includes a pin contact between said second means and said third means.

19 33. The mobile communications device of Claim 31 wherein said third
2 means includes a keypad on a flip.

20 34. The mobile communications device of Claim 33 wherein said keypad
2 is on an exterior portion of said flip.

21 35. The mobile communications device of Claim 34 further including a
2 body for housing said second means.

22 36. The mobile communications device of Claim 35 wherein said fourth
2 means includes a hinge for physically connecting said flip to said body.

23 37. The mobile communications device of Claim 34 wherein said first
2 function is a lighting function for providing backlighting to said keypad.

24 38. The mobile communications device of Claim 34 wherein said second
2 function is a keypad reading function for enabling said second means to read
user-input from said keypad.

25 39. A personal digital assistant comprising:
2 a keypad mounted on a flip for providing a first input signal;
a body having a computer for processing said first input signal and
4 providing an output signal in response thereto;
a hinge connecting said flip to said body;
6 a pin contact between said flip and said body for providing an electrical
connection between said flip and said body when said flip is closed; and
8 multiplexing circuit for selectively providing said first input signal from
said keypad to said body and providing a second signal from said body to said
10 keypad via said electrical connection.

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40. The personal digital assistant of Claim 39 wherein said hinge is
2 positioned with respect to said flip and said body so that said keypad is
exposed when said flip is closed.

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41. The personal digital assistant of Claim 39 wherein said personal
2 digital assistant includes a cellular telephone.

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42. The personal digital assistant of Claim 39 wherein said body includes
2 a display mounted on an exterior of said body for displaying said output signal.

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43. The personal digital assistant of Claim 39 wherein said second signal
2 is a power signal for providing a lighting function to said keypad.

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44. The personal digital assistant of Claim 39 further including means
2 for reading said first input signal.

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45. The personal digital assistant of Claim 44 wherein said means for
2 reading said first input signal includes an analog-to-digital converter for
digitizing said first input signal.

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46. The personal digital assistant of Claim 45 wherein said computer
2 runs software for reading said digitized first input signal.

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47. The personal digital assistant of Claim 46 wherein said multiplexing
2 circuit includes means for multiplexing said first input signal and said second
signal on said pin contact at a rate sufficient to provide lighting to said keypad
4 while enabling said computer to read said first input signal.

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48. The personal digital assistant of Claim 47 wherein said rate is
2 approximately greater than 30Hz.

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49. The personal digital assistant of Claim 47 wherein said means for
2 multiplexing includes a timer for establishing said rate.

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36/ 50. The personal digital assistant of Claim 49 wherein an output of said timer is connected to a bypassing circuit for selectively bypassing a pull-up resistor to a high voltage in response to said output of said timer, thereby selectively providing a low voltage state or a high voltage state at an output of said bypassing circuit at said rate, said output of said bypassing circuit connected to said pin contact on said body.

37/ 51. The personal digital assistant of Claim 49 wherein said keypad includes a resistive ladder for providing a key-identifying voltage indicative of said first user-input signal in response to said pressing of a key by a user.

38/ 52. The personal digital assistant of Claim 51 wherein an output of said resistive ladder is connected to said pin contact on said flip, thereby providing said voltage indicative of said first user-input at said pin contact.

39/ 53. The personal digital assistant of Claim 51 wherein said software includes means for reading said key-identifying voltage when said output of said bypassing circuit is at said low voltage state.

40/ 54. The personal digital assistant of Claim 49 wherein said keypad includes a lighting circuit connected to said pin contact that is activated when said output of said bypassing circuit is at said high voltage state and de-activated when said output of said bypassing circuit is at said low voltage state.

41/ 55. The personal digital assistant of Claim 54 wherein said lighting circuit includes one or more light emitting diodes.

42/ 56. A method for providing input from a keypad and providing lighting to said keypad over an electrical connection comprising the steps of:
providing a signal over said electrical connection indicative of a key pressed on said keypad;
lighting said keypad via said electrical connection; and
selectively activating and/or de-activating said step of lighting and said step of providing at a predetermined rate.

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